MAUI COMMUNITY COLLEGE

ANNUAL INSTRUCTIONAL ASSSESSMENT PROCEDURES AND MEASURES

Associate in Electronics and Computer Engineering Technology Degree

College Mission Statement

Program Mission Statement

To provide relevant and rigorous training, internships and job placement for entry-level computer and electronics engineering technology positions in Maui County.

PART I. Quantitative Indicators for Program Review

Demand/Efficiency

1. Current and projected positions in the occupation (for CTE programs)
EMSI data from Spring 2006: CURRENT 778; NEW 2. The EMSI crosswalk of DOL occupations to the ECET program is not currently accurate. The mathematical and computer occupations and network and system administrators should be mapped to ECET. This would add CURRENT 3720: NEW 106. I am working with the MCC institutional researcher to correct this issue. There are other occupations in the DOL data that could be mapped to ECET.

2. Annual new positions in the State (for CTE programs)
EMSI data crosswalk indicates 2 positions. 108 when corrected to include mathematical and computer occupations and network and system administrators. Should be noted EMSI data does not disclose tech jobs that are being filled with mainland transplants. EMSI data is based on historical trends and does not show emerging industries

3. Number of applicants
I usually start between 16 and 24 students in a cohort.

4. Number of majors
There are currently approximately 35 active majors. The spring 2006 institutional data show up to 60 registered ECET majors.

5. Student semester hours for program majors in all program classes
Data not available

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6. Student semester hours for all program classes
   Data not available

7. FTE program enrollment
   Data not available

8. Number of classes taught
   Data not available

9. Average class size
   6-10

10. Class fill rate
    Data not available

11. FTE or BOR appointment program faculty
    Two, Mark Hoffman and Sandra Swanson

12. Semester credits taught by lecturers
    Fall 7, Spring 4

13. Percent of classes taught by lecturers
    Fall 2/10 = 20%, Spring 1/10 = 10%

14. FTE workload (credits taught/full teaching load)
    Note: Full teaching load is generally defined as 27 or 21 credits
    Depending on program
    Greater than 100%

15. Major per FTE faculty
    30

16. Number of degree/certificates awarded in previous year by major
    4

17. Cost of program per student major
    The ECET program pays for all faculty, lecturers, and equipment from extramural funding. In addition the ECET program grants generate RTRF funds that have not been returned to the program. Last years funds were over $200K and RTRF is estimated at $50K.

Costs may be calculated:

Faculty

$100,000/60 = $1667

Lecturers

11 credits X $2000/60 = $366

18. Cost per SSH
    Data not available

19. Determination of program's health based on demand and efficiency (healthy, cautionary, unhealthy)
    Healthy.

Outcomes

1. Attainment of student educational goals
2. Persistence of majors fall to spring
3. Graduate rate
4. Transfer rates
5. Success at another UH campus (based on GPA)
6. Licensure information where applicable
7. Perkins core indicators for CTE programs
8. Determination of program's health based on outcomes (healthy, cautionary, unhealthy)

PART II. Assessment Results for Program Student Learning Outcomes (SLOs)

Program SLOs are under constant revision in the ECET program. There are two AS degree paths; Electronic Engineering Technology (EET) and Computer Engineering Technology (CET). Both pathways are under revision to better align program SLOs with the immediate requirements for the local Maui high technology industries. The EET pathway requires training in electro-optics and photonics to directly support the Maui space surveillance site (MSSS) at Haleakala and the subcontractors in Kihei and Wailuku. The new PSLOs will support the new 5 acre Institute for Astronomy facilities in Kula and IfA telescopes on Haleakala. The PSLOs will prepare a local resident

workforce to support the Advanced Technology Solar Telescope, should this project be funded. Haleakala has been chosen as the preferred site for this $180M project and the National Science Foundation has asked the ECET program to submit a funding request to develop curriculum for these training activities. The proposal was submitted Fall 2006, will be approved or denied in Spring 2007, and if approved funded from Fall 2007 – Summer 2012. This new training will be developed in cooperation with Hawaii and Kauai Community Colleges and is planned to be delivered as distance education to the three campuses. The VP of the Office of Research Services, Jim Gaines and the Chancellor for Community, John Morton are both supporting this initiative and are providing UH system funding for these activities. ECET has received $70K so far for this program. Expected enrollments expected to be under 10 per class initially. This program is seen as of strategic importance for the university and state, and is supported by Uh system, National Science foundation and the national solar observatory. This program will be designed as a 2+2, such that students will have a pathway to a BS without leaving Maui. The IfA and UH West Oahu are interested in helping to provide the BS.

The Computer Engineering BS also requires some modifications to meet the needs for employment as IT professionals on Maui and to support the high technology activities as computer engineering technicians. CISCO Certified Network Associate industry certified training has been successfully implemented from PCATT and OCET into the ECET program. Course in COMPTIA A+ certification were developed for ECET. These courses have not bee taught as we do not have qualified faculty nor lecturers. As a result there is a lack of training in the professional installation and support of windows networking

servers and workstations. Students can take the ABIT office PC repair course, but this course is not designed with the rigor and relevance required for an IT professional.ECET can provide professional level training in unix/Linux. This is a requirement from our local high technology companies located at Haleakala and Kihei Tech Park. But there still is a need for the program to provide professional level window training that is not met by the ECET program or any other program on campus. The ECET PSLs are being aligned with other similar programs throughout the university vis the program coordination council (PCC). The IT/ECET/CENT PCC has determined that training fro IT professionals is required throughout the system. We are working towards a 2+2 BAS degree with Honolulu CC and West Oahu that is articulated with ECET and provide the rigor and relevance for employment on Maui as an IT professional. There is some need for database skills. These will be addressed through a modification of the Unix/Linux courses.

PART III. Curriculum Revision

Courses reviewed/revised for currency, accuracy, integrity
Math 107
Physics 105
ETRO 101, 105, 201, 205, 298
ICS 111, 211, 251, 252, 175, 258, 298

PART III. Analysis Data

1. Alignment with mission
   The program is aligned with it's mission

2. Strengths and weaknesses based on analysis of data

The strengths are in the partnerships with local industry and federal funding sources. The weakness is in the training for IT professionals. The data indicates under enrolled courses. However the ECET program should not be measured against the norm for all liberal arts courses. The program is of strategic importance and has a good match between number of students, cost and number of local jobs available.

3. Evidence of quality
   Financial support from National Science Foundation.
   Financial support from the UH Office of Research Services
   Financial support from the Office of the Chancellor for Community College
   Support of intent from the Board of Regents
   Support of intent from partners at Kauai, Hawaii, and Honolulu CCs

4. Evidence of student learning
   Students receive internships and job offers from local companies. Students are successful when transferring as juniors to other university engineering programs. Students are employed by local industry.

5. Resource sufficiency
   There is not enough support from MCC General fund or MCC RTRF accounts. The program would not be where it is today without continued extramural funding sources. Lack of program participation from all ICS faculty will become evident in Fall 2007 when Sandra Swanson retires.

6. Recommendations for improving outcomes

PART IV. Action Plan

General Action Plan

The Action Plan for ECET is to return to the original program structure with two AS degrees. This will be accomplished by removing the High Performance Computing Specialty as a separate degree track. The program map will be modified such that the two degrees will return to Electronics Engineering Technology (EET) and Computer Engineering Technology (CET). Each of these degrees has an action plan that will provide rigorous and relevant training directly related to technology job opportunities on Maui. The program map will include preparatory courses as is done at Kauai Community College and here at MCC for our Allied Health program. The Program map will include technical electives to allow for maximum flexibility in course scheduling, to insure maximized class enrollments, and to relieve overloaded faculty.

Electronics Engineering Technology (EET) Action Plan:

Maui Community College Electronics Engineering Technology (EET) AS Degree program is working with the EET programs at Hawaii Community College and Kauai Community College to improve these programs by providing training directly related to local industry opportunities. The Department of Business, Economic Development, and Tourism and the Maui, Hawaii, and Kauai Economic Development Boards identify these strategic industries. These industries provide high-technology career opportunities and

living wages for employees. Working through the program coordination council the three EET program have formed the Hawaii Photonics Alliance. The goals of this alliance are to provide training at the AS degree level in Optics, Photonics, and related technologies.

1. The Hawaii Photonics Alliance will add technical electives in Optics, Photonics, Remote Sensing including GIS, Image Processing, and Astronomical Instrumentation. These courses will fulfill MCC's EET AS degree requirements and form a certificate offering from Maui Community College.
2. Maui Community College ECET program will work with the UH Institute for Astronomy in Kula and local Industry to provide additional Lab experiences and curriculum as a third year certificate offering for EET AS degree graduates and industry employees. This certificate will be pursued as an "Advanced Professional Certificate". This model has been successfully implemented at Honolulu Community College's CENT program. CENT is also a member of our Program Coordination Council.
3. Maui Community College ECET program will work with the UH Institute for Astronomy (IfA), The UH College of Physics, and The UH College of Engineering to provide a baccalaureate degree offering for EET AS graduates. This degree will be initially be granted by the IfA. Students will use IfA facilities and be taught be a combination of MCC and IfA faculty. Coordination with UH Engineering will allow for maximum articulation to the Electrical Engineering Degree program at Manoa.

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4. Maui Community College ECET program will work with Kauai and Hawaii to offer courses via distance education. We will align our program offerings and have comparably equipped labs at the three campuses. This will allow for the maximum number of students and faculty to participate in the program improvement project and provide for a larger pool of potential certificate and baccalaureate seeking students.
5. Maui Community College ECET program will work with local industry to continue our highly successful Akamai Internship Program. This program has been funded since 2002 by the Center for Adaptive Optics (CfAO). CfAO funding will expire in 2009 and without some other funding source the program will cease.

The Hawaii Photonics Alliance – Project Description April 26, 2007

The state of Hawaii is has geography that demands collaboration between the remote rural outer islands of Hawaii, Maui, and Kauai. Maui Community College is uniquely positioned to lead this collaboration. Maui has scientific and national defense assets and activities that tie it to each of the other outer islands. Each of these islands has electronic engineering degree programs at the local community colleges. Many students on these islands cannot leave their homes to study engineering technology on the island of Oahu, where the main Manoa campus of the University of Hawaii is located. On Maui there are scientific astronomy observatories located at the summit of Haleakala. The University of

Hawaii's Institute for Astronomy manages these observatories. The two main research areas are solar physics and full sky surveys for "killer" asteroids. Also located on Haleakala is the Air Force Advanced Electro-Optical System (AEOS) telescope. This is the largest telescope in the Department of Defense. There are a number of smaller telescopes at the summit that operate missions for our National Defense, such as the GEODDS telescope that are tracking "space junk". On the island of Hawaii there are the some of the worlds most advanced telescopes for scientific research. The largest telescope in the world, the twin Keck observatories, is located at the summit of Mauna Kea on the island of Hawaii. The Air Force also has operations on the island of Hawaii at the Pohakuloa Training Area where live fire exercises are being replaced with the Joint Threat Emitter, a laser system. On the island of Kauai at Barking Sands is the Pacific Missile Range Facility (PMRF). This facility recently completed two successful missile interceptions that were tracked by a variety of optical and remote sensors, both land and sea based. These facilities require a trained workforce with the specific knowledge of electronics, optics, photonics, and remote sensing. The scientific observatories and the defense contractors are on the advisory boards of the community colleges and have reported a strong desire to hire a local workforce. They currently are importing workers from the continental United States. These workers typically do not stay long in Hawaii due to the cost of living and other limiting factors. At the same time there are many talented local students that yearn for an opportunity to work in high technology and stay on their home islands, where they have family roots and cultural ties. Photonics is the enabling technology of the 21st century as electronics was for the 20th. Start up costs and geographic isolation necessitates a coordinated development effort as long-term goals

include articulation with a baccalaureate engineering technology program at the University of Hawaii. A needs survey published by the Center for Occupational Research and Development (CORD) indicates that 1800 photonics technicians are needed per year in the United States, while currently there are only 110 graduates per year. Hawaii's demand for these technicians comes from the observatories at Mauna Kea and Haleakala, and the Pacific Missile Range Facility. Additionally, the telecom industries on the islands of Maui, Hawaii, and Kauai have a technician workforce that is nearing retirement age at the same time the infrastructure is being upgraded from copper to fiber optics. It is this background that drives this Hawaii Photonics Alliance proposal.

The Hawaii Photonics Alliance is a project that improves the electronics engineering technology programs on the remote isolated rural outer islands of Hawaii, Maui, and Kauai. The proposed activities will enhance the curriculum of these programs by meeting the workforce requirements of the observatories and defense contractors for electronics technicians with specialized skills in optics, photonics, and electro-optics. These technicians will support the design engineers and astronomers at locations sited above.

Program improvement will take place by researching, adapting, and implementing national skill standards from a variety of sources. Some of these have been identified in preliminary investigations funded by the University of Hawaii's Office of Research Services. Examples of standards are the National Skill Set from Op-Tec. Op-Tec is the National Science Foundation's National Center for Optics and Photonics Education. The electronics engineering program chair from each of the islands has attended the first and

second workshops from Op-Tec and is prepared to start the implementation process. Another standard is the ANSI Z136.1 American National Standard for the Safe Use of Lasers. IEEE standards for fiber optic communication will be included in the program improvement. Skill requirements will also be gathered from the local advisory boards and included in the curriculum as well. One example is that the electro-optic technicians employed at the telescopes require workplace competency in cryogenic systems that cool the astronomical instrumentation.

The Hawaii Photonics Alliance intends to use materials developed under the National Science Foundation project PHOTON2. PHOTON2 is currently developing "project based learning" that should be very effective for teaching content and process skills to the community college electronics engineering students. There are other materials already developed for an introductory astronomy lab course and a color and light inquiry that could be adapted for this project. The project will research, adapt and implement materials developed elsewhere that use innovative techniques and new technologies to address the competencies required for the unique workplaces on the three islands.

Scientific experts from the University of Hawaii's Institute for Astronomy (IfA) will participate in the project, bringing world-class research experience into the program improvement project. Researchers from the IfA will help design and facilitate lab experiences. The IfA will provide access to their laboratories and observatories on Maui. Industry experts will participate by holding workshops in the technologies specific to their workplace. Industry expert have successfully piloted a four-week module on Matlab

at Maui Community College. At Kauai Community College industry experts have taught fiber optics. The University of Hawaii's College of engineering at Manoa on Oahu will also participate by providing guidance and video training so that the program will complement the design-engineering curriculum at the Manoa research institution and help to articulate the program with Manoa's baccalaureate engineering degree programs.

This project intends to use a distance education infrastructure that will allow experts from each island to provide training to all three community colleges. This will greatly increase the capacity of each of the colleges and allow the faculty to operate in a cohesive manner as a unit. The project seeks to equip each of the electronics laboratories with similar equipment such that the video courses can also contain the hands-on lab work that is essential for the students to succeed in the workplace.

The Hawaii Photonics Alliance will provide internship experiences for students enrolled in the electronics engineering technology programs. Industry on Maui and Kauai and observatories on Maui and Hawaii are committed to providing internship placements for students. These internships will range from an 8-week full-time summer project to year round part-time positions. The project will provide stipends that will allow the full participation of the students, without the need for additional employment during the internship period.

The Hawaii Photonics Alliance will facilitate workshops for high school teachers and high school students. These workshops will introduce the opportunities for high

technology employment, optics and photonics content, and problem solving process skills required in the workplace. These workshops are intended to increase awareness and recruit high school students into the degree programs at the community colleges. This will provide a pipeline of local workforce for the industry and observatory employers.

The Hawaii Photonics Alliance will include major components of program improvement. Industry standards and the unique workplace competency requirements for Hawaii, Kauai, and Maui will be included in AS degree programs at three community colleges. Educational materials from a variety of other sources will be researched, adapted and implemented. Optics, photonics, and electro-optics technical content will be added to existing electronics degree programs and new courses developed. Internships will provide students with workplace experiences. Modern pedagogy such as inquiry and problem-based learning will be used to increase students' knowledge of the specialized content areas. Adaptive Optics is one example of modern instrumentation to be utilized in the project. The University of Hawaii's Institute for Astronomy will provide community college students access to a wide variety of state-of-the art instrumentation. The Hawaii Photonics Alliance will improve electronics engineering technology degree programs by implementing national skill standards, adding rigorous coursework in photonics, and using new and engaging instructional methods. The project will produce a pool of potential workers from the local high schools and provide a degree pathway with internship and job placement assistance. This will greatly benefit the local high technology workplace and raise the standard of living for the local community.

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Computer Engineering Technology (EET) Action Plan:

The Computer Engineering Technology Degree program requires efforts in Windows System Administration and Networking Technology training. The goal for this AS degree is to have students ready for employment as information technology system administrators for cross platform workstation and server computer systems that include Windows PCs, Unix/Linux, and Mac OS. Software applications such as Microsoft Office, Apache Web Servers, ArcView , My SQL and programming languages PHP, C, and MatLab should be taught. Compute hardware and software courses need to be updated and the equipment used in these courses must be brought up-to-date. We need to identify faculty to lead this effort. Our networking courses are in fair shape due to the outstanding efforts of Stuart Zinner. However the networking course could be improved by offering CCNP courses in addition to the CCNA course currently offered. Wireless networking and VOIP are technologies that should be included in the curriculum. Our ECET PC hardware and software course have not been offered in several years. We are relying on Business Technology's "Office PC repair and maintenance" course. This course does not have the rigor required for an information technology professional as it is designed for a business professional that may do limited work on computers. This area of education in the ECET program needs to be improved and then should lead to the upper division ICS courses at MCC as an optional BS degree program. The students would then have a path towards a baccalaureate degree that would truly prepare them for employment as information technology professionals and upper division ICS classes would gain enrollment.

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PART V. Budget Implications

Electronics Engineering Technology AS

Several grants are currently under review to support ECET program improvement and development. These total over $4,000,000 for the next 5 years. The UH Office of Research Services and the Chancellor for Community Colleges have indicated a commitment of $100,000 per year for 4 years to support this effort.

MCC budget implications and recommended actions for administration:

Return RTRF funds generated from grants to the PI for infrastructure support with the unit. Approximately $90,000/yr for past 4 years.

Permanently reduced teaching load for the program coordinator. Under 12 contact hours per semester.

Hire immediate fill behind for program coordinator. $ 36,000 per year

Replace computer and lab equipment in high technology areas . 100,000 per year

Funding for software application licenses. 30,000 per year

Hire FT lecturers and faculty. 150,000 / year

Hire student lab assistants. $40,000/ year

Hire PT administrative assistant, $20,000 / year

Faculty release for training. 3 credits per semester per faculty member.

Training travel and fees: 30,000/year

Participant Support, travel, and housing for Akamai Program: $90,000/ year

Participant Support for High school teachers: $20,000/ year

Tuition assistance for faculty: $5,000 / year

Increased Internet Bandwidth to Labs: $10,000 / year

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